January 23, 1890.

Sir G. GABRIEL STOKES, Bart., President, in the Chair.

The President announced that at the next meeting a Member of Council would be balloted for in place of the Rev. S. J. Perry, deceased.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

I. "On a Photographic Method for determining Variability in Stars." By ISAAC ROBERTS, F.R.A.S. Communicated by Professor J. NORMAN LOCKYER, F.R.S. Received January 14, 1890.

(Abstract.)

Some of the uncertainties which necessarily attend the determination of variability in the brightness of stars by eye observations are removed by the application of photographic methods, and particularly by that of giving two or more exposures of the same photographic plate to a given sky space, with intervals of days or weeks between each exposure.

In this way any errors caused by atmospheric, actinic, or chemical changes, together with those due to personal bias, are eliminated, and the study of stellar variability can be pursued under conditions that admit of the necessary exactitude.

As an illustration of the applicability of this dual photographic method, the enlargement on paper from the negative, which accompanies the full paper, shows the results obtained by two exposures of the same plate to the sky in the region of the great nebula in Orion. The first exposure was of two hours' duration on the 29th January, and the second of two and a half hours on the 3rd February, 1889. The stellar images formed during the two exposures are 0·0122 of an inch apart, measured from centre to centre, and are therefore comparable with each other in the field of a microscope. When the images are examined in the manner thus indicated and their diameters also measured by means of a suitably made eye-piece micrometer, it is found that at least ten of the photographed stars, the magnitudes of which are estimated to range between the 7th and 15th, have changed to a considerable extent in the short interval of five days.

The Royal Society is collaborating with JSTOR to digitize, preserve, and extend access to *Proceedings of the Royal Society of London.* www.jstor.org

The ten stars referred to are to be found within an area of less than two square degrees of the sky, and in the table given are the coordinates of their positions with reference to *theta Orionis*. The measurements of the diameters of their photo-images on a scale of 0·00002 of an inch are also given.

II. "Physical Properties of Nickel Steel." By J. HOPKINSON, D.Sc., F.R.S. Received January 16, 1890.

Mr. Riley, of the Steel Company of Scotland, has kindly sent me samples of wire drawn from the material concerning the magnetic properties of which I recently made a communication to the Royal Society. As already stated, this material contains 25 per cent. of nickel and about 74 per cent. of iron, and over a range of temperature from something below freezing to 580° C. it can exist in two states, magnetic and non-magnetic.

The wire as sent to me was magnetisable as tested by means of a magnet in the ordinary way. On heating it to a dull redness it became non-magnetisable whether it was cooled slowly or exceedingly rapidly by plunging it into water. A quantity of the wire was brought into the non-magnetisable state by heating it, and allowing it to cool. The electric resistance of a portion of this wire, about 5 metres in length, was ascertained in terms of the temperature; it was first of all tried at the ordinary temperature, and at temperatures up to 340° C. The specific resistances at these temperatures are indicated in the curve by the numbers 1, 2, 3. The wire was then cooled by means of solid carbonic acid, the supposed course of change of resistance is indicated by the dotted line on the curve, the actual observations of resistance, however, are indicated by the crosses in